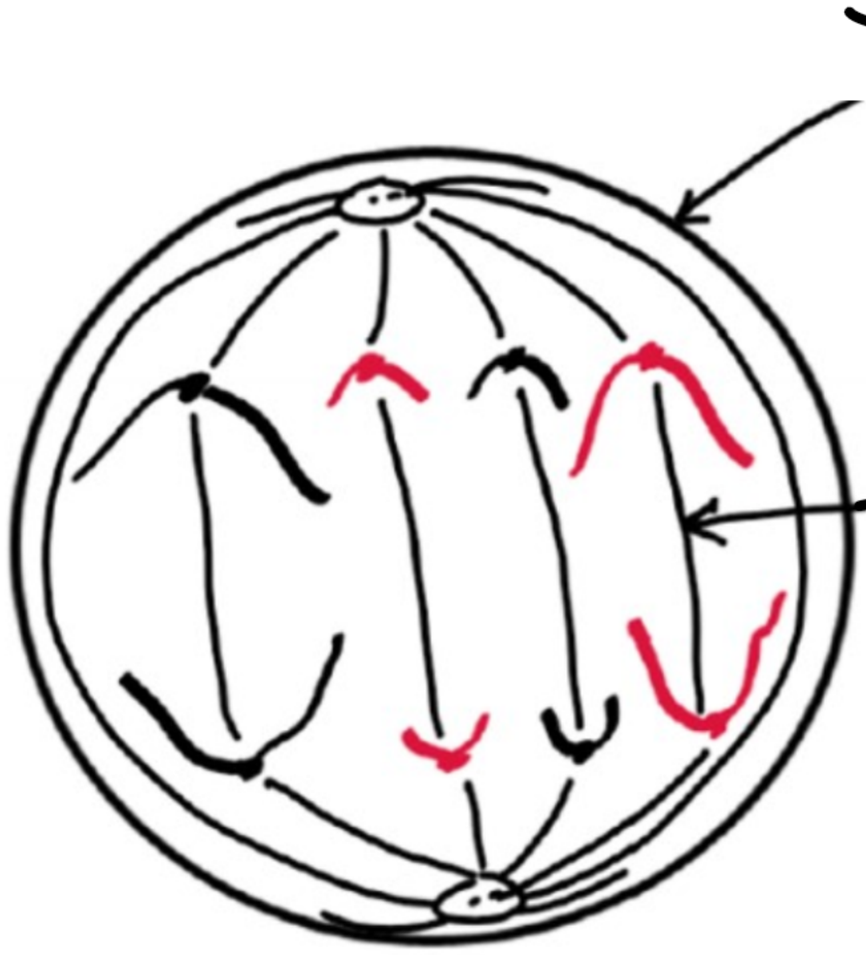
III ANAPHASE



→ It is the SHORTEST phase.

→ Centromere splits and the sister chromatids separate. These separated chromatids are now called chromosomes.

→ Each chromosome posses only ONE Chromatid

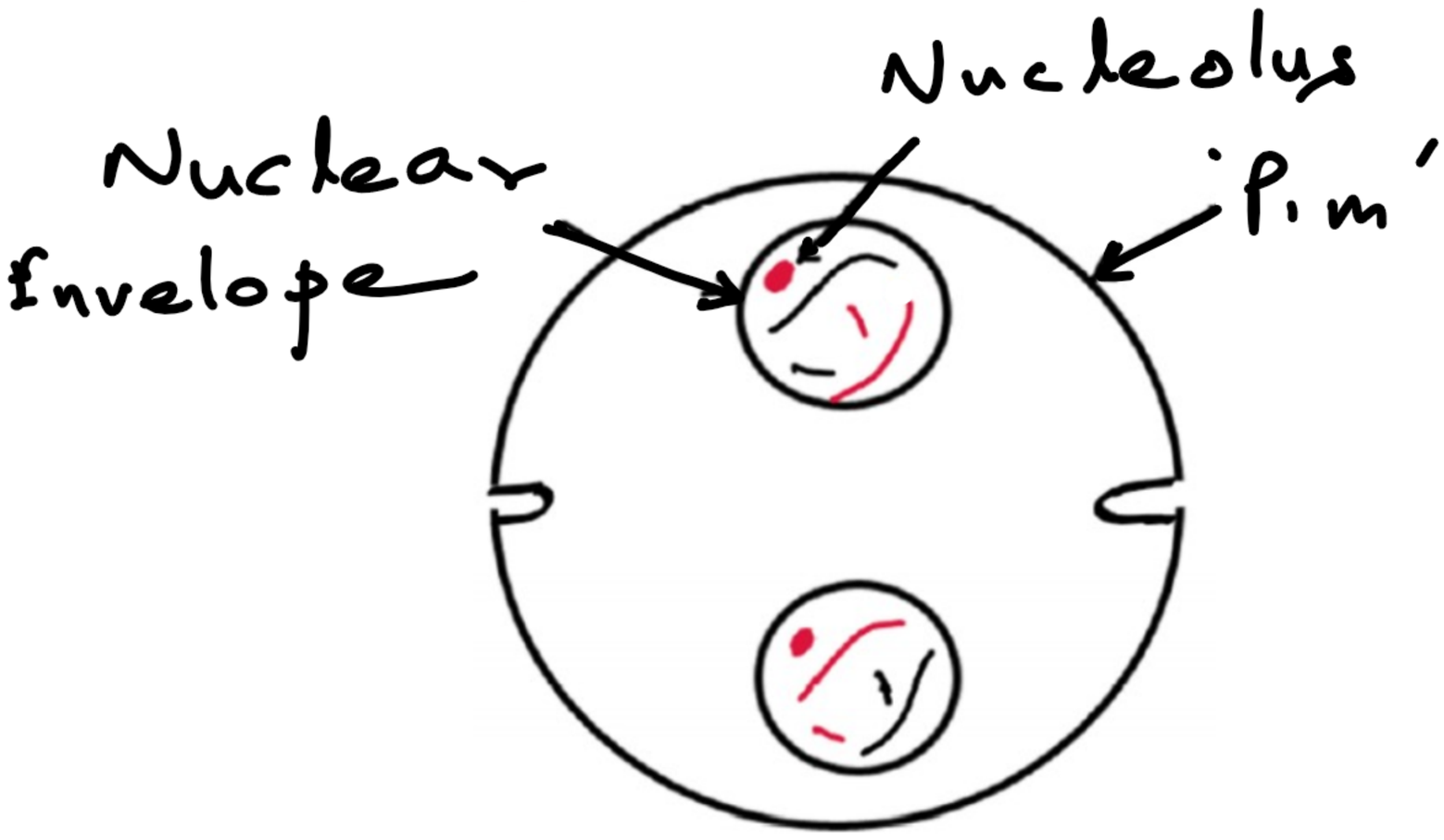
→ Chromosomes appear with different shapes — V, L, J and I shaped.

→ Anaphase movement of chromosomes towards opposite poles occur due to two main reasons:

ⓐ Due to polymerisation of interzonal fibres (pushing action)

ⓑ Due to depolymerisation of chromosomal fibres (pulling action)

Ⅳ TELOPHASE



→ Chromosome cluster at opposite poles and their identity is lost as discrete (distinct)

elements (due to decondensation).

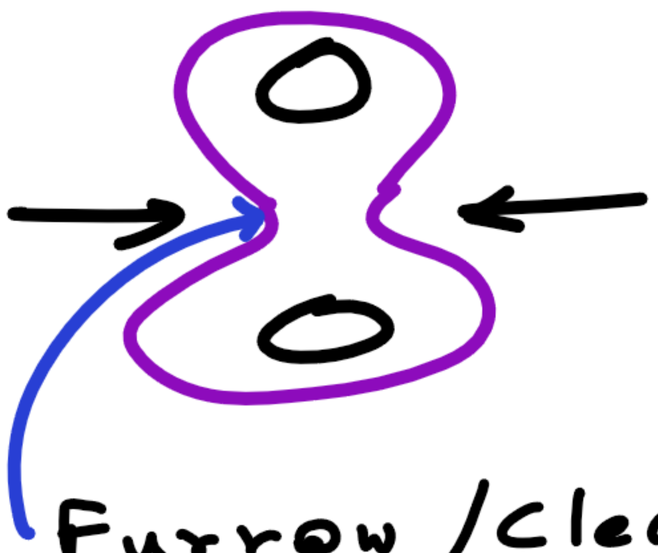
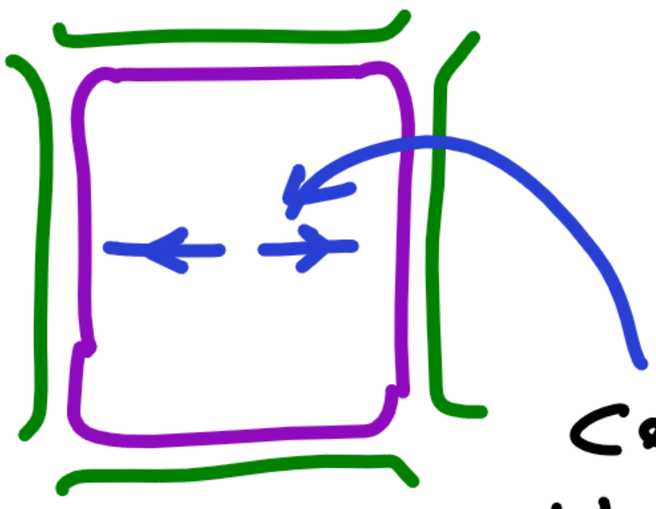
→ Nuclear envelope and nucleolus reappear. Golgi and E.R also reform.

→ Each chromosome possess one chromatid.

CYTOKINESIS

→ It leads to the formation of two daughter cells finally.

Diff:

Animal cell cytokinesis	Plant cell cytokinesis
	
# Occurs by furrow / cleavage formⁿ which proceeds centripetally.	# Occurs by cell plate formⁿ which proceeds centrifugally.

NOTE :

In animals, mitotic cell division is seen only in the diploid somatic cells, except in some social insects.

(eg) Drone bees where haploid cells also divide by mitosis.

Plants can show mitosis both in haploid and diploid cells.

H/W ① significance of mitosis

② Mitotic inhibitors/poisons

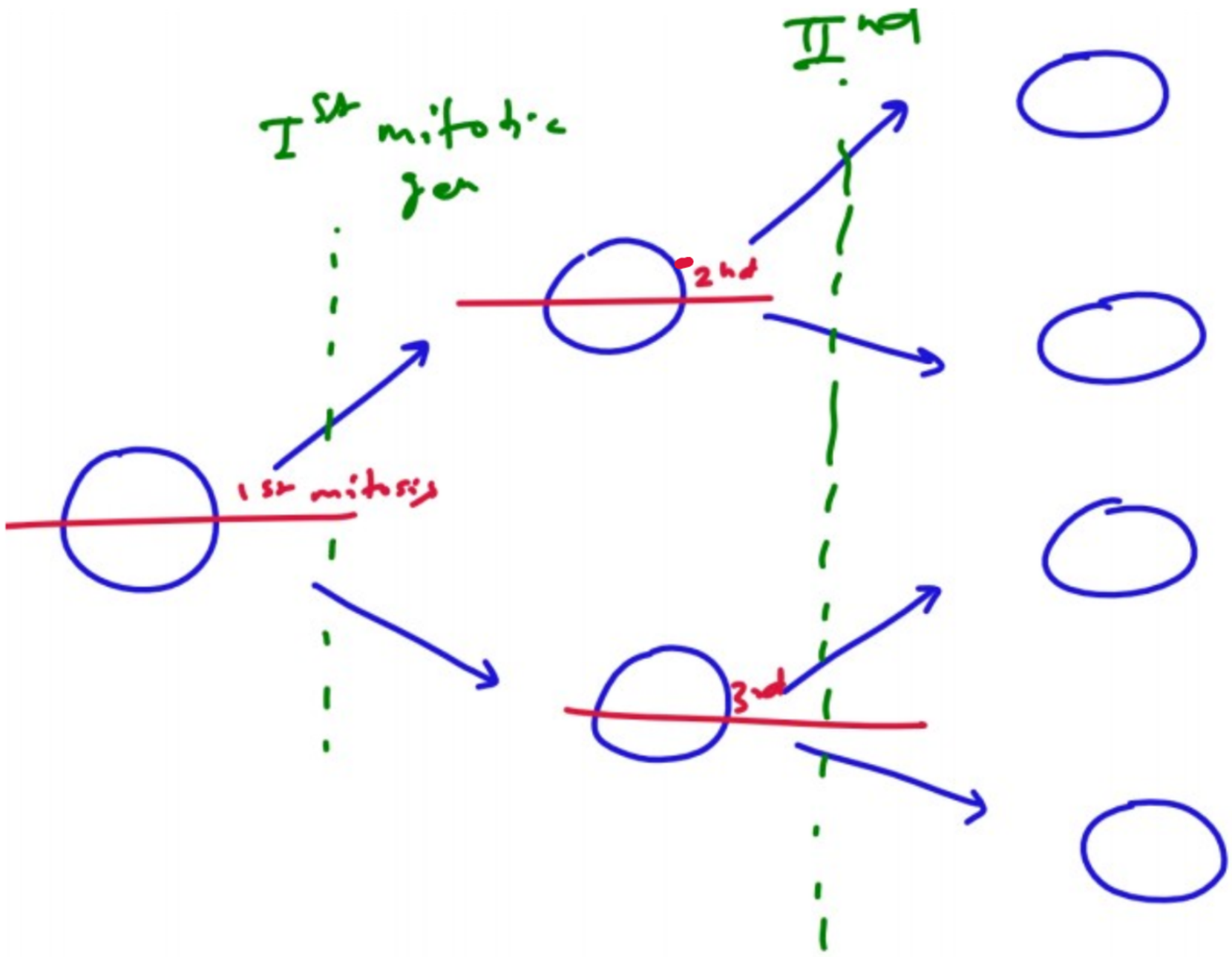
Formulae :

① Total no. of mitotic divisions / mitoses required to produce 'n' no. of cells (starting from a single cell)

$= (n-1)$

② We can also calculate the total no. of mitotic generations (x) to produce 'n' no. of cells by the formula,

$2^x = n$



No. of mitoses to produce 4 cells (initiating from a single cell) = 4 - 1 = 3

No. of mitotic generation (x) = 2

$$2^x = 4$$

$$2^2 = 4$$

Summary of mitotic cell division for a human mitocyte (eg. somatic cell, 2n = 46)

Properties	G_1	S	G_2	P	M	A (each pole)	T (each pole)	CK (each daughter cell)
No. of chromosomes	46	46	46	46	46	46	46	46
No. of chromatids	46	92	92	92	92	46	46	46
No. of ds DNA molecules	46	92	92	92	92	46	46	46
DNA content	2C	4C	4C	4C	4C	2C	2C	2C

MEIOSIS

→ It is a reductional cell division because the daughter cells have half no. of chromosomes in comparison to the parent cell.

→ Meiosis involves two sequential cycles of nuclear division and cell division, called Meiosis-I & Meiosis-II but ONLY a single cycle of DNA replication.

→ The cell division of a cell undergoing meiosis is as follows:

Interphase ($G_1 \rightarrow S \rightarrow G_2$) → Meiosis-I → Interkinesis OR Intermeiotic interphase → Meiosis-II

→ Meiosis-I is initiated after the parental chromosomes have replicated to produce identical sister chromatids at S-phase.

→ Meiosis involves pairing of homologous chromosomes and recombination b/w non-sister chromatids of homologous chromosomes.

→ Four haploid cells are produced after Meiosis - II (gametes / spores).

→ The cell which undergoes meiosis is called a meiocyte (2n).

In plants, male meiocyte is called Microsporocyte / Microspore Mother cell (M:MC) and female meiocyte is called Megasporocyte / Megaspore Mother cell (MeMC).

In animals, the male meiocyte is called Primary spermatocyte and the female meiocyte is called Primary oocyte.

NOTE :

Types of Meiosis

Zygotic / Initial

→ Meiosis occurs in the zygote

→ Eg : Green algae like Chlamydomonas, Spirogyra

Sporic / Intermediate

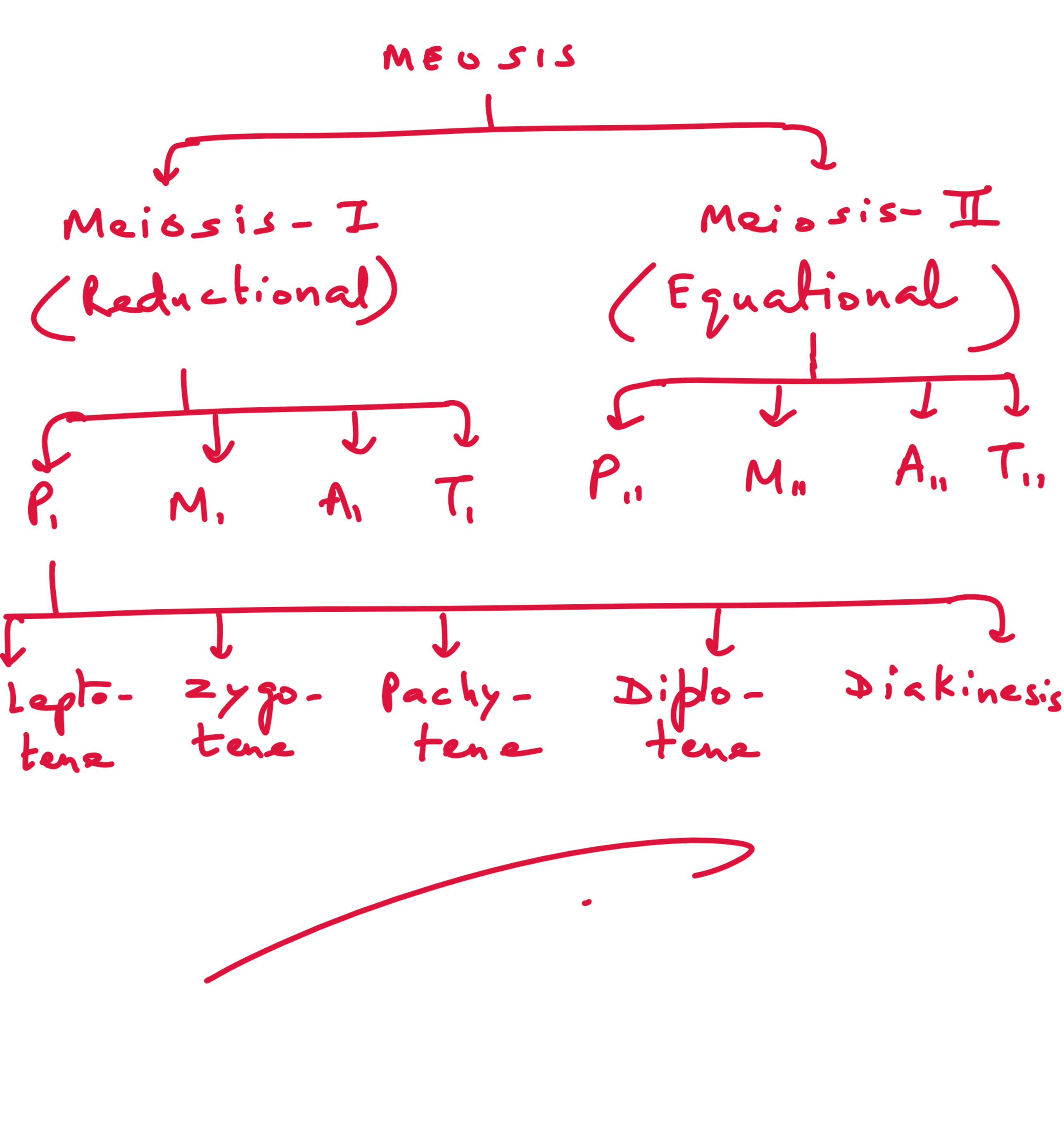
→ Occurs at the time of spore formⁿ

→ Eg : Bryophytes, Pteridophytes, Gymnosperms & Angiosperms

Gamatic / Terminal

→ Occurs at the time of gamete formⁿ.

→ Eg : Brown algae like Fucus and animals.


MEIOSIS
Meiosis - I
(Reductional)
Meiosis- II
(Equational)
P1
M1
A1
T1
PII
MII
AII
TII
Lepto-tene
zygo-tene
Pachy-tene
Diplo-tene
Diakinesis